Actions You Can Take to Protect Your Lake

- Creating a Lake Friendly Home
- How and Why to Start or Join a Lake Group
- How to Obtain Funding for Your Lake
- Laws That Protect Your Lake

Thoughtful Landscaping

If you reside on lakefront property, use environmentally friendly landscaping techniques to prevent sedimentation and pollution.

- If possible, build homes where the land has the gentlest slope.
- Leave as much vegetation on slopes as possible to reduce the velocity of run off and to filter out sediments.
- Create the greatest possible buffer along the shoreline (a minimum of 30’ is recommended) by leaving existing vegetation and rocks or by planting small shrubs. This buffer will reduce the effects of storm water runoff and erosion from waves and deter geese from the lawn, while still providing a view of the lake.
- Develop a winding dirt path to your shore or dock. The reduced slope of a winding dirt path generates less erosion and run off than a steep paved path.
- Do not add sand to your beach area; introduced sand is a major source of sedimentation and phosphorus.

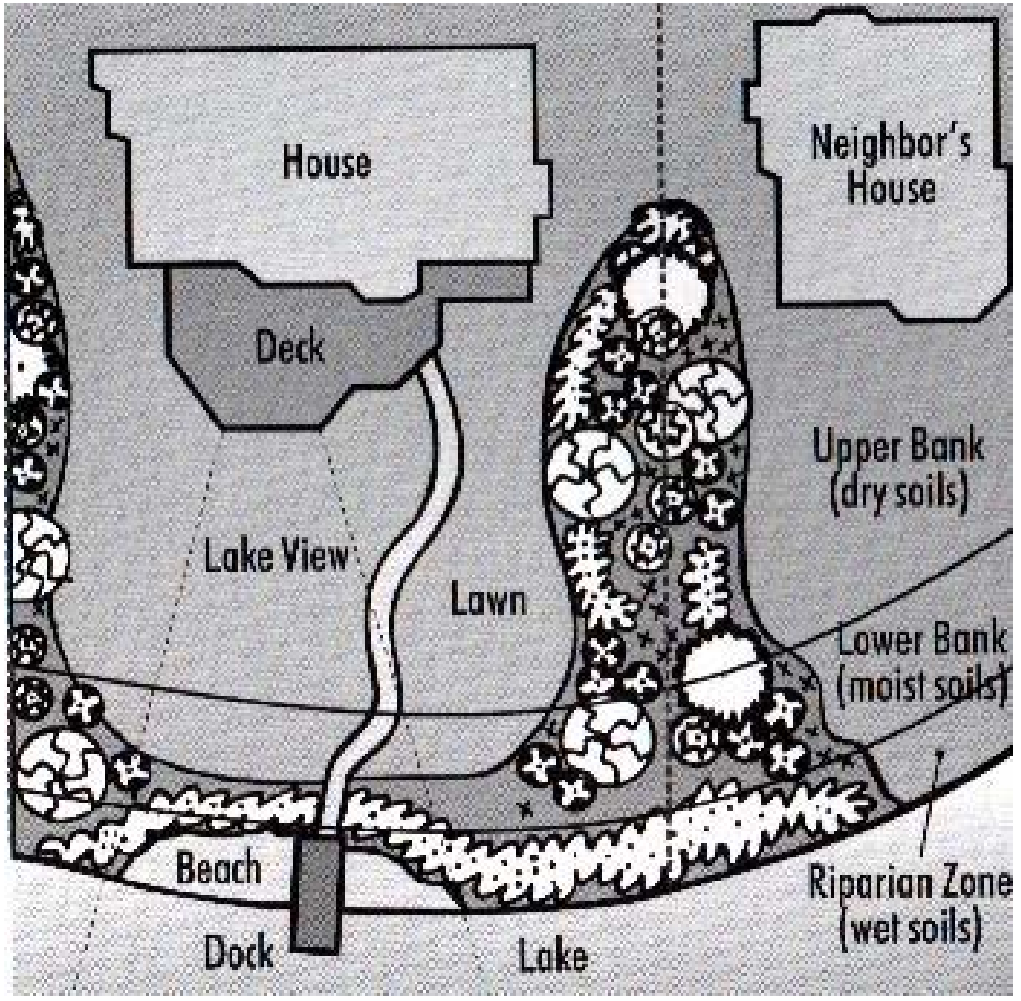
Thoughtful Landscaping cont…

- If you plan to do construction in an area where the soil will be left unprotected, use hay bales and fabric fences to hold the soil in place. Mulch disturbed areas just prior to the final grading.

- Improve your driveway so that stormwater is diverted through u-shaped gravel or vegetated ditches that are designed to filter sediments and nutrients.

- Work with your town to improve drainage from town roads and parking lots.

- Direct run-off towards wooded areas so sediments, toxins and nutrients can be filtered out. Work towards a goal of zero runoff from your property.



Reduce Phosphorus

Reduce the level of phosphorus that is released into the watershed and/or lake.

- Carefully read the levels of phosphorus in cleaning products and make wise choices. If the code on the packaging begins with ”O” then there is less than 0.5% phosphorus, however, if the code begins with a ”P” the phosphorus content is higher. (All, Bold, Arm and Hammer, Green Mark, Cheer, Dash, Bright Water, Surf, Whisk, Shop n' Save have less than 0.5%)
- Perform a lawn test in the spring to determine if fertilizer is needed, before applying. For information visit: www.umass.edu/plsoils/soiltest
- Do not fertilize or use herbicides prior to or just after any precipitation because stormwater runoff may carry the phosphorus and toxins to the lake.
- Select plants that require little fertilization and spot treat with liquid fertilizer only as needed. To determine the phosphorus content in the fertilizer, read the middle number in the formula on the package. For example: 16 **4** 8. Four is the phosphorus content.

Maintain Your Septic Tank

- Conserve water and reduce the burden on your septic system by fixing leaking faucets. Choose Commercial drain cleaners carefully as many may be harmful to the groundwater and to your leach field.
- Monitor the levels of sludge in the septic system and have the tank cleaned when it reaches half full. When septic systems are not pumped routinely, the leach field may become clogged.
- Bleach, drain cleaners, chemicals, and paints harm beneficial microorganisms in the septic system. Paper towels, cigarettes and garbage disposal debris should never be flushed as these products can overload the septic system.

Reduce Hazardous Materials

Consumer products such as paints, paint thinners, solvents, batteries, and household cleaning products are hazardous materials and need to be disposed of properly. Many of these products cause cancer and once released into the environment, will remain there for many years.

•Seek alternatives to hazardous cleaning products and reduce the use of heavy metals.

•Store hazardous materials in approved containers, in a safe location, and check for leaks.

•Never dispose of oil or gasoline on your driveway or street. Many gas stations recycle batteries and oil.

•Dispose of solvents and paint thinners responsibly because these products are toxic to the environment and are not biodegradable. Watch for a **Hazardous Waste Disposal Day** or encourage your town to hold one.

•Do not purchase mercury thermometers. Mercury is very toxic and exposure can cause hearing, memory or vision loss, paralysis, psychological effects, kidney problems and at high doses, death. Mercury can cause congenital malformations, and pregnant women can pass mercury along to their child after eating contaminated fish. If you own a mercury thermometer, learn about disposal and trade-in options. (see contacts on back inside cover)

Reduce the Use of Pesticides

- Pesticides can be harmful to the environment so always follow safety precautions.

- Refrain from using pesticides during or after a storm and do not discard left over pesticides down drains or on the ground; always dispose of properly.

- Rake as little as possible because leaf litter will help to soak up toxins.

Alternatives to Pesticides

- Marigolds help repel asparagus beetles
- Pour beer or vinegar in a shallow pan to attract and trap snails and slugs
- Bacterial spray can be used to kill gypsy moths during their larval stage
- Cockroaches can be removed with a 1:1 powered sugar and boric acid mix sprinkled along baseboards and in corners. Make sure that no water is available for the cockroaches to drink.
- If you do need to use pesticides, check suggested websites.

Select Native Plants

Native plants are ideal for landscaping lakeshore homes, and are often more disease resistant and hardier than their exotic counterparts and thus require less pesticide and fertilizer. Many native plants are a good source of food for wildlife and will enhance bird watching and other activities. For a brochure on Landscaping with Native Plants contact the New England Wildflower Society

Selected Aquatic Alternatives

Exotic	Native Options
Fanwort (*Camomba caroliniana)*	Water Buttercup (*Ranunculus*) Water Marigold (*Megalodonta)*
Water Milfoil (*Myriophyllum ssp.)*	Coontail (Ceratophyllum)
S.American Waterweed (E*geria densa)*	Native Waterweed (*Elodea*)
Hydrilla *(Hydrilla)*	Coontail (Ceratophyllum)
Yellow Water Lotus (*Nelumbo lutea*) (native but highly invasive plant)	White Water Lily (*Nymphaea odorata*)
Purple Loosestrife (*Lythrum salicaria)*	Gayfeather (*Liatris spicata*), Cone Flower (*Echinacea purpurea)* Willowherb (*Epilobium angustifolium*)

Many species, native or non-native, can become invasive when they are released into a waterbody. Never dispose of aquarium or water garden plants or animals into a waterbody. In addition, use caution when selecting plants because suppliers often advertise species by a variety of names. Bring a guide with you to the store for accurate identification.

Starting a Lake Group

If you live on or near a lake, starting a lake group is a good first step towards protecting your lake's future and resolving problems that are currently threatening your lake 's health. Although one person working alone can make a difference, a group of people with similar concerns and interests have a much larger voice and can have a greater impact. Members of a lake association meet to discuss lake issues and determine courses of action to protect their lake. You and your neighbors can:

- Attend town meetings to be a voice for your lake,
- Apply for grants to protect or improve your lake,
- Monitor your lake or pond for invasive species and to check water quality,
- Work with the towns to address watershed issues including increased cleaning of storm drains, implementing new storm water control techniques,
- Work with planning boards to reduce the impact of increasing development,
- Attend workshops to gain more knowledge about lake ecology, hydrology etc., and
- Hold training workshops to educate the community about lake and watershed issues

The Congress of Lakes and Ponds (COLAP) is an organization that provides guidance to lake and pond associations. They can assist you in developing an association and provide opportunities for training, networking and support. Email: Hildrethcr@aol.com Website: www.colap.com

Guidance Material

Starting a Lake Association
To request a brochure (free) contact UW-Extension, Lakes Management Program, College of Natural Resources, Un. of Wisconsin, Stevens Point WI 54481 or call 715-346-2116

Citizen Monitoring
To order send $5.00 to NALMS P.O. Box 5443 Madison, WI 53705 or call 608-233-2836

Handling Conflicts on Your Lake
Write Ecovision Associates 76 E. Sherwood Road, Williamstown, MI 48895-9435
or call 517-347-2652

In Current Repair
To order send $15.00 to Dane County Lake and Watershed Commission 210 Martin Luther King Blvd. Room 421, Madison WI 53709 (video about non-point pollution)

Your Lake and You
NALMS PO Box 5443 Madison, WI 53705 5443 email:nalms@nalms.org
or visit the web at www.nalms.org

Lake Line
NALMS PO Box 5443 Madison, WI 53705 5443 email:nalms@nalms.org
or visit the web at www.nalms.org

Managing Lakes & Reservoirs
NALMS PO Box 5443 Madison, WI 53705 5443 email:nalms@nalms.org
or visit the web at www.nalms.org

Funds For Your Lake

State Grants

Department of Environmental Protection Grants

319 Nonpoint Source Grant Program

This grant program focuses on projects that implement measures that address the prevention, control and abatement of non-point pollution; target the major source(s) of nonpoint source pollution within a watershed/subwatershed; have a 40 percent non-federal match of the total project cost; contain an appropriate method for evaluating the project results; address activities that are identified in the Massachusetts NPS Management Program Plan.

- RFR: are typically issued by the DEP each February.
- Who Can Apply: Any interested Massachusetts public or private organization.
- Contact: Department of Environmental Protection
  627 Main St. Worcester, MA 01608

Source Water Protection Technical Assistance/ Land Management Grant Program

This grant provides funds to third party technical assistance organizations that assist public water suppliers in protecting local and regional ground and surface drinking water supplies.

* RFR: are issued each program year.
* Who Can Apply?: Third party organizations that have experience providing technical assistance related to drinking water protection.
*Information available: www.mass.gov/dep/brp/dws/dwspubs.htm or www.comm-pass.com

University of Massachusetts

Massachusetts Water Watch Program

The Massachusetts Water Watch Partnership (MassWWP) provides training and other technical assistance to citizen organizations who conduct water quality monitoring programs on the lakes, rivers, and estuaries of Massachusetts.

For information visit: http://www.umass.edu/tei/mwwp/

Federal Grants

Natural Resources Conservation Services

Watershed Protection and Flood Prevention Program

This program works through local governmental sponsors to solve natural resource and related economic problems on a watershed basis. Projects include watershed protection, flood prevention, erosion and sediment control, water supply, water quality, fish and wildlife habitat enhancement, wetlands creation and restoration, and public recreation in watersheds of 250,000 or fewer acres.

Contact: state headquarters at (413) 253-4350 or www.nhq.nrcs.usda.gov

Laws that Protect your Lake

State Laws

This section summarizes some of the principle state laws that govern lake and shoreland activities in Massachusetts. The information is intended as a general guide only. If you plan to conduct any activities in or near the water you should contact your local conservation commission and the Department of Environmental Protection (DEP) for additional information and permits.

Massachusetts Wetlands Protection Act

The Massachusetts Wetlands Protection Act (WPA) regulates development activity near or affecting wetlands and floodplains in Massachusetts. The WPA exists to promote the following interests:

- protection of public and private water supply
- protection of groundwater supply
- flood control
- storm damage prevention
- prevention of pollution
- protection of land containing shellfish
- protection of fisheries
- protection of wildlife habitat

In general, the WPA reviews and regulates work that may alter a Wetland Resource Area.
These areas include a variety of lands that are affected in some way by water resources such as bordering vegetated wetlands, swamps, marshes, meadows and bogs, banks and dunes. To be protected under the WPA, these resource areas must be land under water or bordering a water body (lake, pond, river, stream, creek, estuary or the ocean).
Activities proposed within one hundred (100) feet of a resource area are also subject to regulation as work within the Buffer Zone.
The WPA's definition of "alter" is broad enough to potentially trigger the regulation of all lake/pond restoration and maintenance projects. Most development impacts are considered an alteration, including changes in drainage, salinity, sedimentation, water flow, flood retention, water levels, water temperature or other characteristics of the receiving water.
Applications (called Notices of Intent or NOI) for permits (called "orders of conditions" or OOC) under the WPA must be submitted to the local conservation commission for review. The NOI provides a complete description of the site and the proposed work.

Common Lake Issues cont….

Green Cotton-like Clouds

Green clouds floating in shallow water may be filamentous algae and their presence does not necessarily indicate a water quality problem. The clouds often occur after heavy run off in the spring or a heat wave in the summer. However, if the algae is found only in specific areas it may indicate a source of local pollution such as a failing septic system or a contaminated stream.

Red Itchy Rash on Swimmers

This rash may be Swimmer's Itch, which is caused by a larval stage of a parasitic fluke, Schistome. When a larva encounters a swimmer it will penetrate the swimmer's skin. The body's reaction to the presence of the larva results in red spots and swelling, similar to a mosquito bite. To avoid Swimmers Itch try a liberal application of suntan oil prior to entering the water, which helps to prevent the fluke from attaching, towel off briskly after a swim, or try swimming in a different area of the lake.

Leeches

These are flat worm-like animals that attach to exposed skin and draw blood. Leeches are found in shallow protected waters and are most active on hot summer days and at night. Leeches are drawn to the disturbances in the water near docks and swim beaches. To avoid leeches, swim in deeper waters off docks and floats.

Resources

- Other Publications
- Lake Contacts
- Useful Lake Links
- Glossary
- References

State Publications

Brochures

Lawns and Landscapes in Your Watershed (DEP)
TMDL's: Another Step to Cleaner Waters (DEP)
Don't Trash the Grass (DEP)
Invasive Plants (DEM)
Shoreline Surveys: Action Tool (DEP)
Clean Rivers Begin at Home: A Guide to Understanding Nonpoint Pollution (DEP)

Manuals and Guides

- Guide to Aquatic Invasive Species (DEM)
- Guide to Aquatic Plants in Massachusetts (DEM)
- Eutrophication and Aquatic Plant Management in Massachusetts (DEP)
- Nonpoint Source Management Manual: A guidance Document for Municipal Officials (DEP)
- Massachusetts Erosion and Sediment Control Guidelines for Urban and Suburban Areas: A Guide for Planers, Designers, and Municipal Officials (DEP)
- Volume I: Stormwater Policy Handbook (DEP)
- Volume II: Stormwater Technical Handbook (DEP)
- A Guide to Lakes and Ponds in Massachusetts Forests and Parks
- Surveying a Lake Watershed and Preparing an Action Plan (DEP)
- Give Your Lake the Blues! (DEP)

State Publications cont…

Other
Boat Ramp Signs “Stop the Spread of Nuisance Species”
Invasive Species Poster
Waterline (a quarterly guide to watersheds, wetlands waterways, drinking water) (DEP)
Online Lake and Pond Maps http://www.mass.gov/dfwele/dfw/dfw_pond.htm

Additional copies of DEP Materials can be obtained by calling a Regional DEP Service Center:
Northeast (978) 661- 7677
Southeast (508) 946-2714
Central (508) 792-7683
Western (413) 755-2124
http://www.mass.gov/dep

DEM materials can be obtained from
Department of Environmental Management
251 Causeway St Suite 700 Boston MA 02114
1-617-626-1382 or 1-617-626-1411
www.mass.gov/lakesandponds

Lake Contacts

Executive Office of Environmental Affairs (EOEA)
251 Causeway St – 9th Floor, Boston, MA 02114 Phone: 1-617-626-1000 www.state.ma.us/envir

Massachusetts Department of Environmental Management (DEM)
251 Causeway St - 6th Floor, Boston, MA 02114 Phone: 1-617-626-1250 www.state.ma.us/DEM
- Lakes and Ponds Program www.mass.gov/dem/programs/lakepond

Massachusetts Department of Environmental Protection (DEP)
627 Main St., Worcester, MA 01608 Phone: 1-508-767-2877 www.state.ma.us/dep/

Massachusetts Department of Fisheries, Wildlife & Environmental Law Enforcement
251 Causeway St – 4th Floor, Boston, MA 02114 Phone:1-617-626-1590
www.state.ma.us/dfwele/dfw/dfw_toc.htm
- Natural Heritage www.state.ma.us/dfwele/dfw/nhesp

U.S. Environmental Protection Agency (EPA) New England Region 1
1 Congress St Suite 1100 Boston, MA 02114 Phone:1-888-372-7341 Emergency # 1-800-424-8802
www.epa.gov/OW/index.html

North American Lake Management Society (NALMS)
P.O. Box 5443 Madison, WI 53705-5443 Phone:1-608-233-2836 www.nalms.org

Massachusetts Congress of Lakes and Ponds (COLAP)
135 Washington Street, Holliston, MA 01746 Phone:1-800-845-2769 www.colap.com

Lakes and Ponds Association of Western Massachusetts (LAPA-WEST)
C/O Hampton Ponds State Park 1048 North Road, Westfield MA 01085 LAPAWEST@aol.com

Massachusetts Water Watch Partnership
Blaisdell House- University of Massachusetts
Box 30820 Amherst, MA 01003-0820 Phone:1-413-545-5531 www.umass.edu/tei/mwwp/

Useful Lake Links

U.S Environmental Protection	www.epa.gov
Envirofacts	www.epa.gov/enviro/index.html
Surf Your Watershed	www.epa.gov/surf
Nonpoint Source Homepage	www.epa.gov/OWOW/NPS
TMDL Home page	www.epa.gov/OWOW/TMDL
U.S. Department of Agriculture	
Agricultural Research Service	www.ars.usda.gov
Natural Resources Conservation Service	www.nrcs.usda.gov
Other Sites	
Environmental Information Resources	www.gwu.edu/~greenu/index2.html
National Wildlife Federation	www.nwf.org
U.S. Geological Service	www.usgs.gov
Washington State Lake Book	www.ecy.wa.gov/programs/wq/plants/lakes/walpa.html
Water on the Web (educational site)	http://wow.nrri.umn.edu/wow/under/primer/index.html
Glossary of useful words	www.nalms.org/glossary/glossary.html
Invasive Species Sites	
Center for Invasive & Aquatic & Plants	http://aquat1.ifas.ufl.edu/welcome.html
New England Wildflower Society	www.newfs.org
Aquatic Nuisance Species Panel	www.protectyourwaters.net
Invasive Species	www.invasivespecies.gov/profiles/main.shtml
USGS Non-indigenous Aquatic Species	http://nas.er.usgs.gov/
For More Information	
on Endangered Species	www.state.ma.us/dfwele/dfw/nhesp
on Hazardous Waste Alternatives	www.metrokc.gov/hazwaste/house/cleaners.html
on Hazardous Material Facts	http://environment.about.com/library/weekly/blchem1.htm
on Pesticides	www.pesticides.org

Glossary A-E

Algae: Algae are small, non-vascular (lacking roots and leaves) plants that grow in the water.
Anoxic water: Waters that contain less than 0.5 ml/l of dissolved oxygen. Most aquatic animals can not survive with so little available oxygen.
Blue-green Algae: Although not actually algae, they are often indicators of high phosphorus concentrations in the water.
Algal Bloom: An algal bloom is the burst of algae growth that can result in scum on the water surface, odor, color or taste changes and decreased oxygen in the water.
Aphotic Zone: Zone where there is insufficient light for photosynthesis, so plants can not survive.
Benthic Communities: The diverse group of animals (including snails, leeches, and some stages of insects) that live in the lake bottom and have a major role in the decomposition of organic material.
Best Management Practices: BMP's are practices that minimize the impact from non-point source pollution including logging, stormwater run-off, construction and agriculture.
Buffer: Trees, shrubs, grass and other plants that lie between a body of water and an area of development. The vegetation helps to absorb nutrients, slow stormwater run-off and reduce sedimentation.
Circulation: The season mixing of layers of water in a lakes or ponds of adequate depth. Often referred to as spring turnover or fall turnover.
Dissolved Oxygen: (DO) Refers to the amount of free oxygen dissolved in the water. Low levels of DO can be harmful to fish and other animals.
Ecosystem: This is a spatial unit including the relationship between living things, and their abiotic environment including one another.
Erosion: The gradual removal of rock or soil particles through the actions of weather (wind, water, and ice) or human activities.
Erosion controls: Methods developed to reduce erosion during human activities. Hay bales, silt fencing, and mulching buffers are all physical barriers that help prevent erosion.
Exotic Species: An exotic species is a species that has been introduced to a new region. Since the species did not originate in the area, it often does not have natural control agents (ex. disease) and may spread rapidly and disrupt the ecosystem.

G- O

Groundwater: Water that travels or is stored beneath the surface of the earth, yet occasionally discharges into lakes, streams or the ocean.
Habitat: An area where animals can find suitable shelter, food and are able to reproduce and live.
Impervious Surface: A surface, such as pavement or rooftops that limit or prevent water from entering and being filtered by the soil. These surfaces disrupt normal groundwater recharge, increase the amount and velocity of run-off, heat the run off and alter natural hydrological flows.
Invasive Species: A species, native or non-native, that is able to spread rapidly and alter or dominate an ecosystem.
Lake: There is no real definition of a lake. Generally speaking, lakes are mixed primarily by wind action, tend to be deeper, have unlit bottom waters, rooted aquatic plant growth only in the lake's margins, and in New England they usually become thermally stratified in the summer.
Lake Ecology: The study of the relationship between living things and the lake environment.
Limiting Nutrient: A nutrient, such as phosphorus, required by plants to grow, that is relatively rare in the environment. Therefore, its availability determines the amount of plant growth.
Limnologist: A person who studies fresh water ecology. Limnologists work on lake management, restoration, pollution control and other issues.
Littoral Zone: The area extending from the shore to the maximum depth of plant growth.
Macrophytes: Vegetation with vascular tissue; considered evolutionarily "higher" than algae.
Nonpoint Source Pollution: Pollution that enters a waterbody from a variety of sources, including stormwater, wildlife influences and recreational activities. Nonpoint source pollution does not come from a specific identifiable source, such a pipe or drain.
Nutrients: Nutrients are substances, including nitrogen (N), phosphorus (P) and carbon (C), that are required for the survival of plants and animals.
Oligotrophic: A term that describes a lake that is not very productive, low in algae and nutrients, usually has clear waters and, if stratified, has adequate oxygen in the lower layer.

P - S

Pelagic Zone: describes “open waters” that do not have contact with the shore or lake bottom.
pH: pH describes the acidity of water on a exponential scale of 1-14. A range of 0-7 is acid, 7-14 is alkaline. A pH of exactly 7.0 is neutral. Derived from a French word meaning “strength of the hydrogen”
Phosphorus: This is a nutrient that is required by all living organisms. Phosphorus is found naturally in the environment and also in fertilizers and sewage.
Photic Zone: The sunlit upper waters that extend from the surface to the point where light dims to 1% of that at the surface.
Photosynthesis: The process by which plants and some other organisms convert carbon dioxide to sugars and oxygen, using the sun’s energy and chlorophyll.
Point Source: Pollution that can be traced to a specific source such as a pipe.
Respiration: The process that utilizes oxygen to convert food molecules, such as glucose, into energy, water and carbon dioxide.
Run-off: Run-off is the water from rain or melting snow melts that runs downward over the earth’s surface. Stormwater run-off is often considered a key source of nonpoint pollution.
Secchi Disk: The Secchi disk is a simple tool used to measure water transparency. The black and white disk is lowered into the water to the point where it is just visible and the depth is recorded.
Sediment: Particles of minerals and organic soil that are carried from one place to another by wind, glaciers and flowing water.
Shoreline Erosion: The loss of soils along a shoreline into the lake. This is often accelerated by the removal of vegetation near the shore that held soils in place.
Succession: the natural process of a lake from nutrient poor to increasingly productive and nutrient rich. Under natural conditions, this process can take thousands of years to occur.

S - T

Secchi Disk: The Secchi disk is a simple tool used to measure water transparency. The black and white disk is lowered into the water to the point where it is just visible and the depth is recorded.
Sediment: Particles of minerals and organic soil that are carried from one place to another by wind, glaciers and flowing water.
Shoreline Erosion: The loss of soils along a shoreline into the lake. This is often accelerated by the removal of vegetation near the shore that held soils in place.
Succession: the natural process of a lake from nutrient poor to increasingly productive and nutrient rich. Under natural conditions, this process can take thousands of years to occur.
Temperate (lake): Lakes that are located in a climate where the summers are warm and the winters relatively cool. This zone extends between the Tropic of Cancer to the Arctic Circle.
Thermocline: The zone of rapid temperature change that creates a physical barrier to mixing. It creates the seasonal upper and lower layers of water in lakes with adequate depth.
Transparency: Describes the clarity of water. When many soils or organic particles are clouding the water, turbidity is increased.
Turbidity: Describes that clarity of water. The presence of suspended matter in the water reduces transparency

References

Text References

Davis, J., Storer, B., Zisette, R. 1995 *The Washington Lake Book*
Washington State Department of Ecology

EPA 1996 *Guide to Environmental Issues*

EPA 1985 *Protecting Our Groundwater*

Horne, A. J., Goldman, C.R., 1994 *Limnology* 2nd Ed. Mcgraw-Hill, Inc, USA

Niering, W. A. 1998 *National Audubon Society Nature Guides: Wetlands* Chanticleer Press, Inc., New York.

EPA Office of Wetlands, Oceans and Watersheds, *Tools for watershed Protection*

DEP. 2001 *Surveying a Lake Watershed and Preparing an Action Plan*
Department of Fisheries and Wildlife

Wisconsin Department of Natural Resources http://www.dnr.state.wi.us/org/water/fhp/lakes/under/

Graphic/ Illustration References

Page 3 "Watershed Illustration" Executive Office of Environmental Affairs
www.state.ma.us/envir/mwi/watersheds.htm

Page 5 "What Is Your Watershed?" map from Executive Office of Environmental Affairs
www.state.ma.us/envir/mwi/watersheds.htm

Page 8 "Hydrologic Cycle" from *Washington State Lake Book*
Washington State Department of Ecology

Page 9 "Lake Layers" illustration from *Tools for watershed Protection* The Office of Wetlands, Oceans and Watersheds, U.S. Environmental Protection Agency

Page 10 "Littoral Zone of a Lake" Diagram
"Managing Lakes and Reservoirs" by NALMS 2002

Page 11 "Phosphorus Budget" diagram from *Tools for watershed Protection* The Office of Wetlands, Oceans and Watersheds, U.S. Environmental Protection Agency

Page 13 "Algae" Illustration from *The Washington State Lake Book*
Washington State Department of Ecology

Page 16 "Eutrophication" diagram
"Managing Lakes and Reservoirs" by NALMS 2002

Page 23, 24 Florida Aquatic Species web site http://aquat1.ifas.ufl.edu/welcome.html
(line drawings of Curly-leaved Pondweed, Common Reed, Variable Milfoil, Hydrilla and Water Chestnut.)
King County web site http://dnr.metrokc.gov/wlr/waterres/smlakes/weed.htm
(line drawings of Fanwort, Eurasian Milfoil and Purple Loosestrife)

Page 27 "Sources of Fecal Coliform" courtesy of Washington State Department of Ecology
www.ecy.wa.gov/programs/wq/plants/management/joysmanual/fecalcoliform.html

Page 28 "Shoreline Design" *The Washington State Lake Book*
Washington State Department of Ecology

Photograph References

Cover photographs- Michelle Robinson
Kayaking- Michelle Robinson
Nature Photography- Michelle Robinson
Fishing- Michelle Robinson
Dogs in the Water- Michelle Robinson
Swimming-
Page 1: *Lake Buel*- Michelle Robinson
Page 2: *Foliage Hill*- Michelle Robinson
Page 13: *Submerged Plants* (Milfoil)- John D. Madson
Floating-leaved Plants- Michelle Robinson
Emergent Plants (Cattails)- Kerry Dressler
Dragon Fly Nymph- http://zebu.uoregon.edu/%7Edmason/Mckenzie/bugs/odonata.html
Leech- Northern Virginia Soil and Water Conservation District
Four Spotted Chaser- Roger Smith
Crayfish-Ohio EPA
Page 14: *Large Mouth Bass*- http://www.nae.usace.army.mil/recreati/bhd/bhbass.htm
Bullfrog - http://animaldiversity.ummz.umich.edu/media/herp/066.herp.jpg
Yellow Spotted Salamander- http://museum.gov.ns.ca/mnh/nature/salamand/yspot.htm
Snapping Turtle- Robert Rold Photography
Mallard Duck- http://www.nae.usace.army.mil/recreati/bhd/bhmallard.htm
Canada Geese- Michelle Robinson
Otter- http://www.nae.usace.army.mil/recreati/bhd/bhotter.htm
Moose- http://www.nae.usace.army.mil/recreati/bhd/bhmoose.htm

Photographic References Cont…

Page 15: *Walden Pond*- C. Danko at http://www.masstraveljournal.com/features/0801walden.html
Red Maple- Michelle Robinson
Eutrophication- Michelle Robinson
Page 20: *Point Source Pollution*-
Page 20: *Non-point Source Pollution*- Nancy Rose
Page 22: *Milfoil*- John D. Madson
Infestation of Milfoil http://www.state.me.us/dep/blwq/topic/invmaterial.htm
(PowerPoint Presentation)
Purple Loosestrife- Michelle Robinson
Page 24: *Asian Clam*
Zebra Mussel
Spiny Water Flea- J. Lindgren
Parrot Feather – Vic Ramey University of Florida
Page 25: *Bearded Boat*- Ladd Johnson (NOAA)
Guy in Boat- Vermont Dept.of Environmental Conservation
Hydrilla on Motor- Alison Fox (Center for Aquatic & Invasive Species FL)
Page 26: *Algal Bloom*- Michelle Robinson
Page 30: *Storm Water Treatment*- Michelle Robinson